

ANCHORING MEANS FOR THE SHEATH OF A BOWDEN CABLE

This invention relates to apparatus for use in anchoring an elongate member to another member and, more particularly, but not necessarily exclusively, to an abutment for use in anchoring a flexible control cable to fixed members of the chassis or bodywork of a vehicle.

A "push-pull" cable is a device for translating a push/pull movement at one location to a push/pull movement (in the same or any different direction) at a different location, often for control purposes, and such a cable comprises a flexible conduit in which a control wire is slidable to perform the desired function. In order for the relative movement of the control wire and the conduit to take place in a controlled manner for the reliable operation of, for example, a clutch or gearbox mechanism or throttle of a motor vehicle, it is necessary that each end of the conduit be anchored, for example to the body of a vehicle. In particular, the practice has developed of anchoring an end of the conduit to an opening in a bracket or bulkhead across which the control cable passes.

In general, such anchorage is achieved by means of a bracket or similar fixed member, having a generally U-shaped slot therein for receiving an abutment attached to a cable. The abutment is located in the slot of the bracket and fixed therein by some means so as to resist withdrawal of the abutment from the slot and also axial movement of the abutment relative to the slot. Conventional fixing means for this purpose have meant that the abutment must be presented to the bracket from a particular direction and orientation, so that corresponding elements of the fixing means on the abutment and the bracket are precisely located relative to each other. In addition, many conventional abutment arrangements tend to have a somewhat complex structure which is relatively difficult and time-consuming to assemble.

In particular in the motor industry, there is a constant requirement to simplify and speed up the vehicle assembly process and it is therefore an object of the present invention to provide apparatus for use in quickly, easily and reliably anchoring an elongate member to another member.

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In accordance with the present invention, there is provided an anchoring device which is suitable for anchoring an elongate member to a fixed member having a slot leading to an edge thereof, the anchoring device comprising a sleeve which is fixable coaxially around said elongate member and which is provided with a circumferential groove, the axial length of which is sufficient to accommodate the thickness of the fixed member at said slot, the outer diameter of the groove being less than the inner diameter of the slot, the anchoring device further comprising a collar member which is carried by, and axially moveable along, said sleeve, said collar member having a leading edge which extends into said groove when the anchoring device is located within said slot, to effectively increase the diameter of said groove and prevent said anchoring device from being withdrawn from said slot, the collar member being arranged such that the leading edge thereof can be withdrawn from the groove by moving the collar member along the sleeve in an axial direction away from the slot, so as to enable the anchoring device to be withdrawn from the slot.

In a preferred embodiment of the present invention, when said anchoring device is located within the slot, the leading edge of the collar member substantially fills the gap between the groove and the slot, said gap being created by the difference in their respective diameters.

The collar member is preferably substantially cylindrical and its leading edge is accordingly preferably substantially circular.

The slot is beneficially generally U-shaped and includes a narrowed neck portion, beneath which said leading edge of the collar member is engaged when the anchoring device is located within the slot. The leading edge beneficially includes a chamfer. The fixed member may also include at least one chamfer at the open edge thereof, the chamfer of the leading edge of the collar member and the at least one chamfer of the fixed member then preferably being arranged to cooperate with each other such that when the anchoring device is inserted in the slot, the fixed member chamfer operates to push the leading edge of the collar out of the groove and away from the fixed member.

The collar member is preferably spring biased in the direction of the fixed member, such that when the anchoring device is fully located within the slot, the leading edge of the collar

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member automatically extends into the groove. The collar member is then beneficially manually retractable against the spring force to withdraw the leading edge thereof from the groove, and enable the anchoring device to be withdrawn from the slot.

The anchoring device may include a load bearing ring surrounding at least a portion of the collar member. The device may further include a spring which is located underneath the collar member and is retained in compression by a cap member.

Embodiments of the present invention will now be described by way of example only and with reference to the accompanying drawings, in which:

Figure 1 is a perspective side view of an abutment according to an exemplary embodiment of the present invention;

Figure 2 is a perspective view of the abutment of Figure 1, a portion thereof being cut-away to illustrate the internal structure of the arrangement;

Figure 3 is a schematic section of the arrangement of Figure 1;

Figures 4 to 6 are schematic side views of an abutment according to an exemplary embodiment of the invention, at various stages of connection with the bracket;

Figure 7 is a schematic, cross-sectional front view of the abutment of Figures 4 to 6 when connected to the bracket;

Figure 8 is a perspective side view of an abutment according to another exemplary embodiment of the present invention; and

Figure 9 is a perspective view of the abutment of Figure 8, a portion thereof being cut-away to illustrate the internal structure of the arrangement.

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Referring to Figures 1 to 3 of the drawings, an abutment for anchoring an elongate member, for example, the sheath of a flexible cable, also known as a "push-pull" cable, is generally indicated at 10. In particular, the abutment 10 comprises a generally cylindrical body 12 having an axial through-cavity 14 along which a sliding core (not shown) of the push-pull cable is normally disposed.

Two cylindrical tubular portions 16a, 16b of smaller diameter than the body 12 extend at opposite ends of the body 12. Portion 16a guides the sliding of the inner core cable and an end rod (which prevents buckling of the inner core cable between a fixing point for the outer cable (non-movable) and a fixing point for the inner cable (movable)). Portion 16b is intended to fix the outer cable to the body 12.

The body 12 comprises a load bearing ring 7 defining two opposed shoulder portions 7a, 7b, the axial distance between which shoulder portions is fixed and defines an engagement portion of the abutment body 12. The abutment further comprises a spring loaded collar 1 having a chamfered end 9 including grooves 6 which allow it pass under the shoulder portion 7a of the load bearing ring 7 and into the engagement portion of abutment body 12. The spring 3 for operating the spring loaded collar 7 is located underneath the collar 7 and is retained in compression by a damper cap 4. As such, the spring force acts axially along the longitudinal axis of the body.

The abutment of this exemplary embodiment of the present invention is intended for use in anchoring a flexible cable to a bracket 8 defining a generally U-shaped seat 20. The upper edges of the bracket 8 are provided with a chamfered lead portion 22, the distance between the upper edges being less than the diameter of the seat 20 so as to define a neck 2. Further, the diameter of the engagement portion of the abutment is less than that of the U-shaped seat 20 of the bracket 8.

Referring in addition to Figures 4 to 7 of the drawings in use, when the abutment is presented to the bracket 8, the lead portions 22 of the bracket 8 picks up the corresponding chamfer 9 on the collar 1, causing the collar to slide backwards against the spring force and enabling the engagement portion of the abutment body to be located in the U-shaped seat 20 of the bracket

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8. When the abutment is fully located in the seat 20, the spring 3 causes the collar 1 to be pushed toward the bracket, and the edge 9 of the collar 1 engages the bracket 8 under the neck 2. It will be appreciated that the collar 1 fills the space defined by the difference in diameters of the engagement portion of the abutment body and the seat 20 of the bracket 8.

The absence of a lead on the underside of the neck 2 in the bracket 8 means that the abutment remains firmly in place within the bracket 8. In order to remove the abutment from the bracket 8, the outside of the collar 1 is manually retracted against the spring force, thereby retracting the chamfered edge 9 of the collar 1 away from the seat 20 of the bracket 8 (and thus widening the opening) so as to enable the abutment to be withdrawn through the neck 2 of the bracket 8.

Referring to Figures 8 and 9 of the drawings, an abutment 10 according to a second exemplary embodiment of the present invention is similar in many respects to that described above, and like features are denoted by the same reference numbers. However, in this case the direction of the locking mechanism 9 has changed from behind to in front of the bracket. This means that the spring 3 and the sliding collar 1 no longer have to be positioned diametrically over the damper cap 4, the diameter of which cannot be reduced due to strength and the size of the internal components. Because the damper cap 4 can no longer be used to retain the spring 3 in the assembly, a spring retaining clip 100 has been added to perform this function.

It will be appreciated that one of the main advantages of the abutment described above according to an exemplary embodiment of the present invention is its ability to be presented to the bracket from any angular orientation - there are no particular elements of the abutment and bracket which need to be matched or lined up. Further, the design achieves automatic firing, i.e. it automatically anchors itself within the bracket when it is fully located therein. The design provides positive location within the bracket, with an audible "click", so that an operative can be certain that the abutment has been correctly and completely located within the bracket. The abutment is easily removable from the bracket, and requires no re-arming before re-fitting. The arrangement also provides a clean external design.

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A specific embodiment of an abutment according to the present invention has been described above by way of example only, and it will be appreciated by a person skilled in the art that modifications and variations can be made to the described embodiment without departing from the scope of the invention as defined by the appended claims.